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SOLID STREAM NOZZLE FOR SPRAYING STANDING TREES INFESTED WITH BARK BEETLES

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In the control of bark beetles infesting lodgepole pine, the number of trees treated per man-day can be increased over 100 percent if the trees can be treated without being felled. The development of penetrating oil sprays has made feasible the control of some species of bark beetles in standing trees. Such treatment has been successful in treating lodgepole pine infested with the mountain pine beetle in Idaho, Wyoming, and Montana, and ponderosa pine infested with the Black Hills beetle in the central and southern Rocky Mountains, where the greater part of the bark beetle brood is in the lower 35 feet of the bole.

To spray the bole of a tree to the height of 35 feet and apply an adequate coverage of insecticide with light equipment, such as a stirrup pump, a special nozzle (fig. 1) has been developed. In developing this nozzle the desired height of spray, the number of gallons per minute, and the pump pressure per square inch were considered. The objective was to obtain the greatest height of application with the smallest stream, so as to conserve the insecticide mixture. This nozzle when used with an 8-foot extension at 42 pounds pump pressure will throw a stream to 35 feet and discharge 2.1 gallons per minute. The nozzle described has been used successfully for the treatment of nearly two hundred thousand trees.

To produce a solid stream, a tapered bore ending in a straight section just back of the aperture was found most effective (see fig. 2). There is a direct relationship between the length of the straight bore and the diameter of the aperture. The straight bore should be only slightly longer than the diameter of the aperture. In the nozzle described, the aperture is 3/32 of an inch in diameter, and the straight bore is 1/8 of an inch long. The straight-bore section and at least one-third of the tapered bore back of the straight section must be "gun bore" smooth, as the rougher "commercial" smooth would cause the stream to break.

Two important points of the nozzle are marked in figure 2 as A and B.

A. This marks the end of the straight bore and there must be no shoulder at this point.

B. The stream must break from the aperture cleanly, as it does from this sharp edge. The edge is formed by rounding the end of the nozzle away from the aperture. The radius of this curve is 5/32 of an inch (see fig. 2). Any "belling" of the aperture must be avoided, because it tends to cause the liquid to follow the curve of the opening and will spread the stream. This sharp edge is protected by an extension of the nozzle, as shown in the drawing.

The nozzles are cut from 5/8-inch hexagonal brass stock, which provides the hexagonal base.

Included in the photograph of the nozzle are the tools for final cutting of the nozzle to produce the gun bore finish. These are called gun-reamers. They are made by turning steel rods down to the dimensions of the interior of the nozzle and then grinding one-half of the rod away to form the cutting edge. The shoulder, which would occur at point A, if the tapered section continued until it joined the straight section, is eliminated by cutting an arc on the reamer to join the straight and tapered sections. The radius and length of arc are indicated in the drawings. The reamer is held in a floating holder while the final cut is being made.

The aperture end is formed by a small milling tool ground to shape and having a pilot to keep it aligned with the bore.

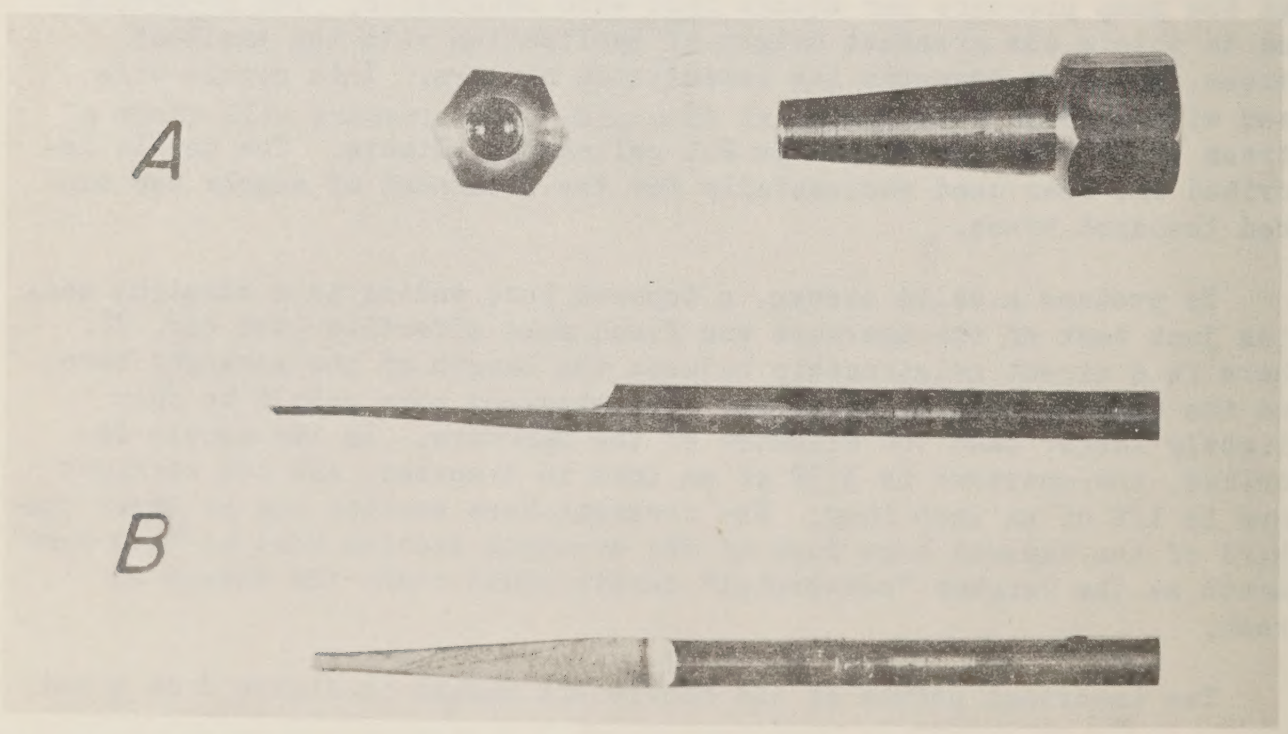

Figure 1.--Solid-stream nozzle: A, Aperture and side view; B, reamer for cutting bore.

SOLID STREAM NOZZLE

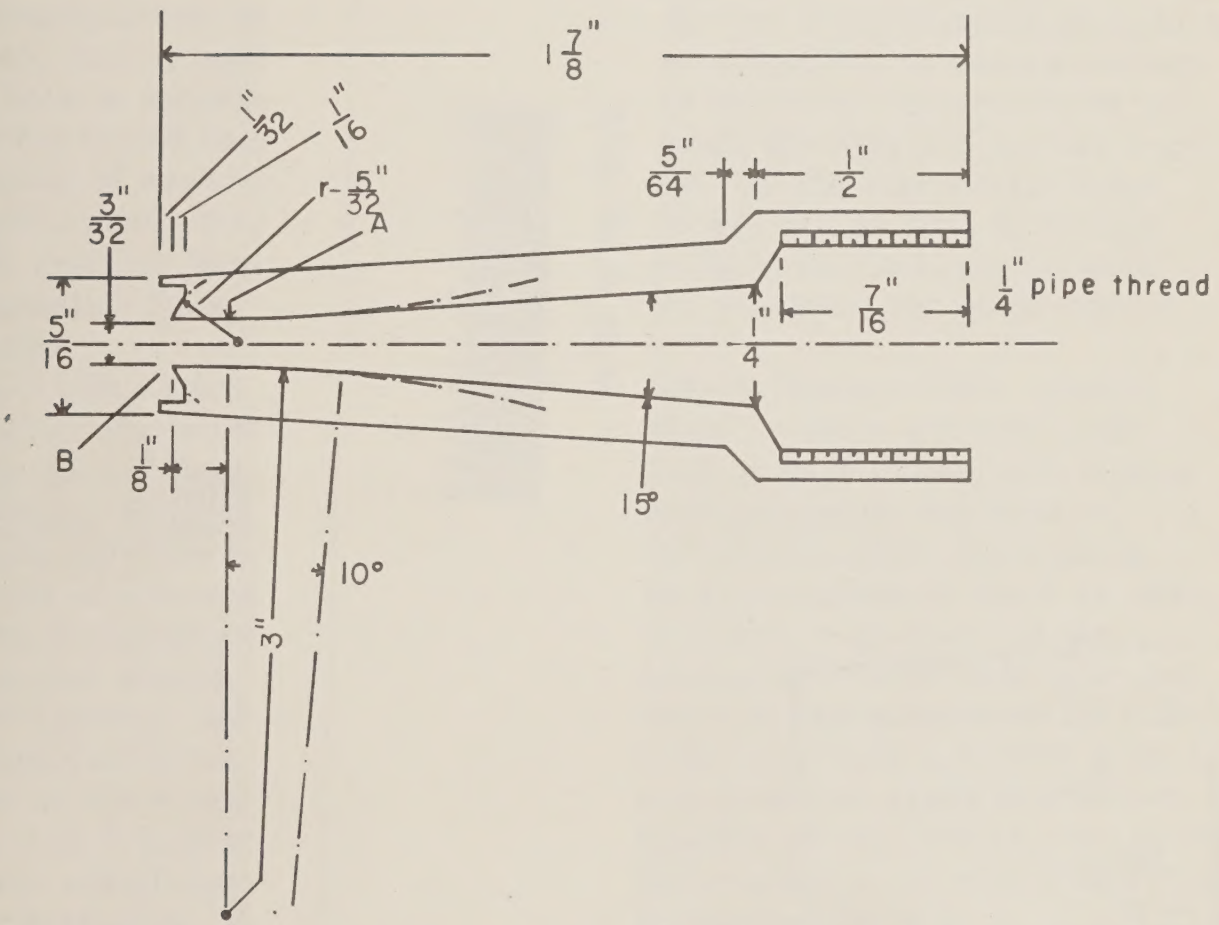

Figure 2.--Diagram showing construction of solid-stream nozzle.